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# POMS project

Anna Mazzacane

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# In these slides

➢ I will give an overview of POMS

➢ I will show some of the many features implemented in POMS

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# POMS

➢ **The Production Operations Management Service** (POMS) is a project to design a service which assists the production teams and the analysis groups of the experiments in their scientific computational work.

➢ POMS provides a web interface to:

- Submit batch jobs

- Monitor job submissions and files delivery

- Recover failed jobs

- Debug failures

- Keep track of configurations used

**POMS**

Automation

Monitoring

Recovering

Debugging
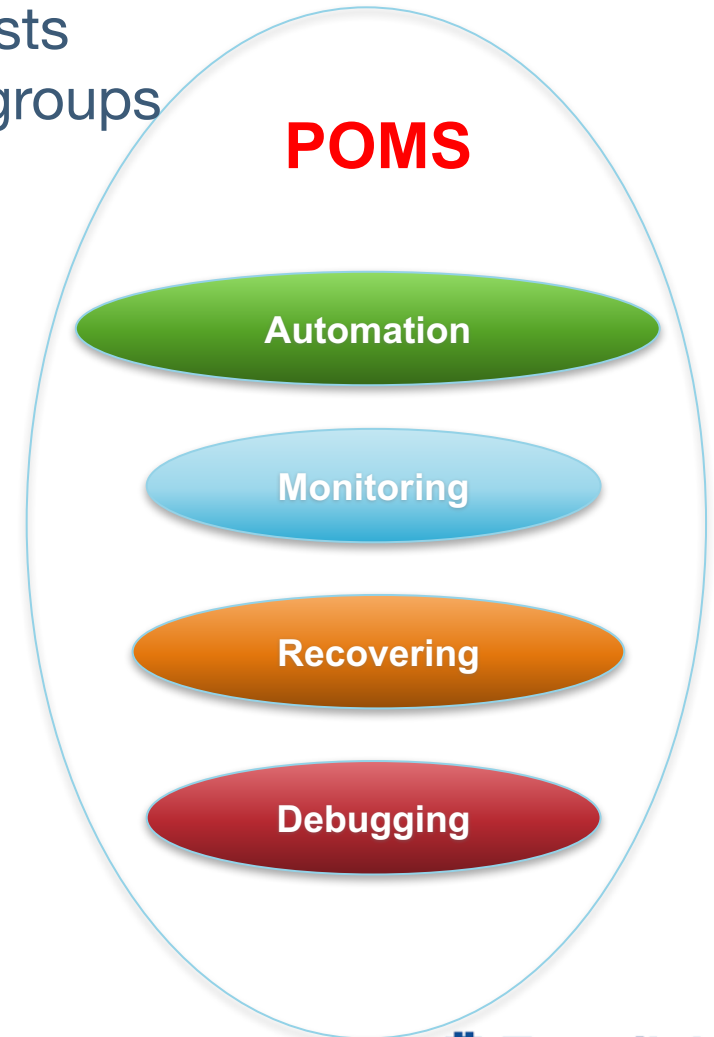
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# What it is needed to use POMS

➢ The production instance of POMS is at
https://pomsgpvm01.fnal.gov/poms/

**Fermilab**

Please enter your SERVICES user name and password.

**Username**

**Password**

Sign On

Fermilab Disclaimer

➢ Use services account to login

➢ Need an experiment affiliation and computing permissions to submit jobs

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# How To Interface To POMS

➢ First important step is how to translate the experimental workflow of a Monte Carlo production or DATA processing into POMS

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# Experimental Workflow – Set Of Stages/Steps



**Simulation**

Event Generation

Physics Interactions

Detector Response

**MC Production**

Event Reconstruction

**Data Processing**
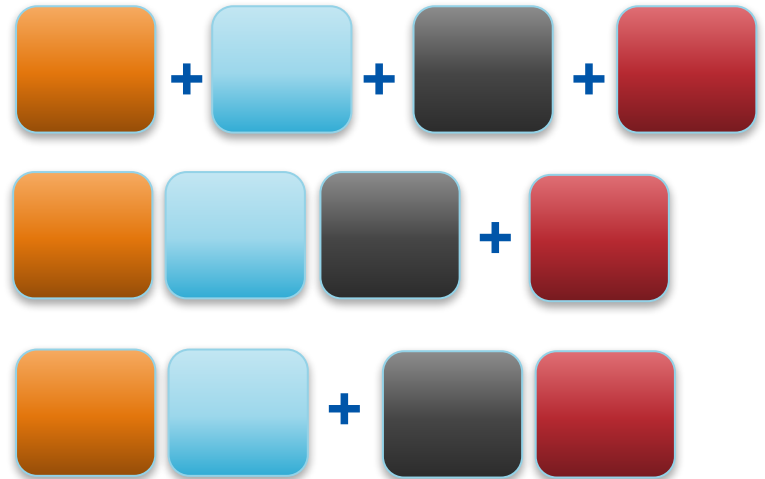
**Workflow variations**

**Example**

(Gen+G4+Detsim) + Reco + Mergeana

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# Experimental Workflow into POMS

➢ Experimental workflow = POMS campaign

➢ A stage in the experimental workflow = POMS campaign stage

**Experimental workflow**

**Stage**

(Gen+G4+Detsim) + Reco + Mergeana

**+** **+**

**POMS campaign stage**

**POMS Campaign**

| mcc9_gen_G4_detsim_protoDune_beam_cosmics_p6GeV<br>**Submissions 1 Located 1** | → | mcc9_reco_protoDune_beam_cosmics_p6GeV<br>**Submissions 2 Located 2** | → | mcc9_mergeana_protoDune_beam_cosmics_p6GeV<br>**Submissions 2 Located 2** |

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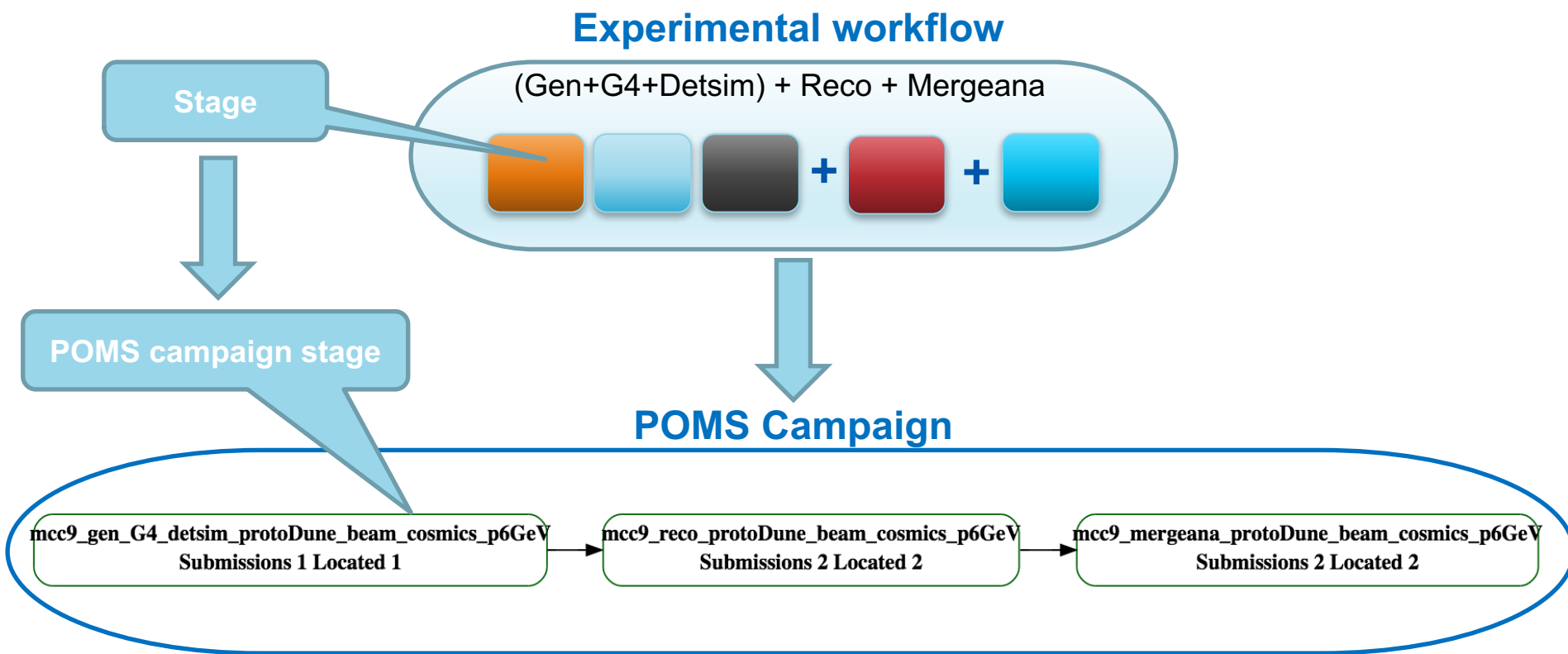
# POMS Campaign Stages

## Campaign Stages ❓

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| dune ▼ |
| production ▼ |

📅

| Mark Campaigns Active/Inactive | Tag/untag Campaigns | Hold/Release Campaign Submission | Show ALL Campaigns Statistics |

| Select All ☐ | Name ⇅ | Active ⇅ | Tags ⇅ | Hold By ⇅ | Creator ⇅ | Created ⇅ |
|---|---|---|---|---|---|---|
| | 6GeV | | dune_mcc9 | | mazzacan | |
| ☐ | mcc9_reco_protoDune_beam_cosmics_p6GeV | No | dune_mcc9 | | mazzacan | 2017-04-30 08:14:24 |
| ☐ | mcc9_gen_G4_detsim_protoDune_beam_cosmics_p6GeV | No | dune_mcc9 | | mazzacan | 2017-04-30 08:13:44 |
| ☐ | mcc9_mergeana_protoDune_beam_cosmics_p6GeV | No | dune_mcc9 | | mazzacan | 2017-04-30 08:15:05 |

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# POMS Campaign Stages Stats

Jobs in 62.0 days ending 2017-06-30 00:00

| Campaign Stage Name | Total All | Active Jobs Idle | Active Jobs Running | Active Jobs Held | Completed Total | Completed Not Located | Completed Located | Removed | Stats %Efficiency | Stats Pending |
|---|---|---|---|---|---|---|---|---|---|---|
| mcc9_mergeana_protoDune_beam_cosmics_p4GeV | 206 | 0 | 0 | 0 | 206 | 0 | 206 | 0 | 64 | 0 |
| mcc9_reco_protoDune_beam_cosmics_p4GeV | 415 | 0 | 0 | 0 | 415 | 0 | 415 | 0 | 110 | 0 |
| mcc9_gen_G4_detsim_protoDune_beam_cosmics_p4GeV | 407 | 0 | 0 | 0 | 407 | 0 | 407 | 0 | 58 | 0 |

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# Campaign Stage Info

## Campaign Stage Info ❓
**Campaign Stage** mcc9_gen_G4_detsim_protoDune_beam_cosmics_p3GeV

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[ dune ▼ ]  [ production ▼ ]

| Total | Active Campaign Jobs | | | Jobs in 278.2 days ending 2018-02-02 06:24:29 | | | Stats | | |
|---|---|---|---|---|---|---|---|---|---|
| All ❓ | Idle ❓ | Running ❓ | Held ❓ | Total Completed ❓ | Not Located ❓ | Located ❓ | Removed ❓ | %Efficiency ❓ | Pending ❓ |
| 405 | 0 🩺 | 0 | 0 | 405 | 0 | 405 | 0 | 63 | 0 |

### Reports/Status

- 📊 Job Efficiency Histogram (1 month)
- 📊 Job Wall Clock Time Histogram (1 month)
- 📊 Job CPU Time Histogram (1 month)
- 📊 Copy In Time Histogram (1 month)
- 📊 Job Copy Out Time Histogram
- ▦ Day by Day Spreadsheet (1wk)
- ☰ Submission Time Bars (1wk)
- 📄 Campaign Submission Files
- ↗ Kibana Usage Info for Campaign

### Actions

- ✎ Edit Campaign
- 🚀 Launch Campaign Jobs Now
- 🗑 Kill running/idle Jobs for Campaign
- ⏸ Hold running/idle Jobs for Campaign
- ▶ Release held Jobs for Campaign
- ↗ Schedule Future Job Launches
- 👁 Mark Campaign Active

### Tags

[ 🏷 Enter tag ]  [ + ]

🔵 ● dune_mcc9  [ 🗑 ]

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# Campaign Stage Info (cont'd)

**Campaign**

**Name:** mcc9_gen_G4_detsim_protoDune_beam_cosmics_p3GeV
**Experiment:** dune
**Dataset:** none
**Software Version:** v06_33_00_01
**VO Role:** Production
**cs_split_type:** none
**cs_split_dimensions:** None

**cs_last_split:** None    ⏮ Reset

**Active:** False
**Created:** 2017-04-29 20:36:56.229675-05:00
**Creator:** mazzacan
**Updated:** None
**Updater:** mazzacan

**Job Type**

**Name:** mcc9_protodune_detsim_3GeV
**Launch Script:** /dune/app/home/dunepro/anna/MCC9/mcc9_SubmissionScriptNew.sh
**Definition Parameters:** [
  ['ProtoDUNE_beam_3GeV_cosmics_3ms.xml', ' ']
  ['detsim', ' '] ]
**Input Files Per Job:** 0
**Output Files Per Job:** 0
**Output File Patterns:** %.root
**Creator:** mazzacan
**Created:** 2017-04-29 20:33:16.509874-05:00
**Updater:** mazzacan
**Updated:** None

**Launch Template**

Name: mcc9_protodune
Experiment: dune
Launch Host: dunegpvm01.fnal.gov
Launch Account: dunepro
Launch Setup: export X509_USER_PROXY=/opt/dunepro/dunepro.Production.proxy; source /cvmfs/dune.opensciencegrid.org/products/dune/setup_dune.sh; setup dunetpc v06_33_00_01 -q e14:prof
Creator: mazzacan
Created: 2017-04-24 10:45:18.216718-05:00
Updater: mazzacan
Updated: 2017-04-26 12:43:23.738891-05:00

GNU Image Manipul...

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# Fifemon Monitoring

➢ Campaign stage profiling

| Campaign memory request and usage | | | | |
|---|---|---|---|---|
| RequestMemory ▲ | Count | Max | Average | Min |
| 3.91 GiB | 180 | 3036092 | 2286364.5423728814 | 1838408 |

| Campaign cpu request and usage (cpuhours) | | | | |
|---|---|---|---|---|
| RequestCpus ▼ | Count | Max | Min | Average |
| 1.00 | 180.00 | 13.66 | 0 | 7.08 |

Sites where campaign ran



— FNAL_GPGrid

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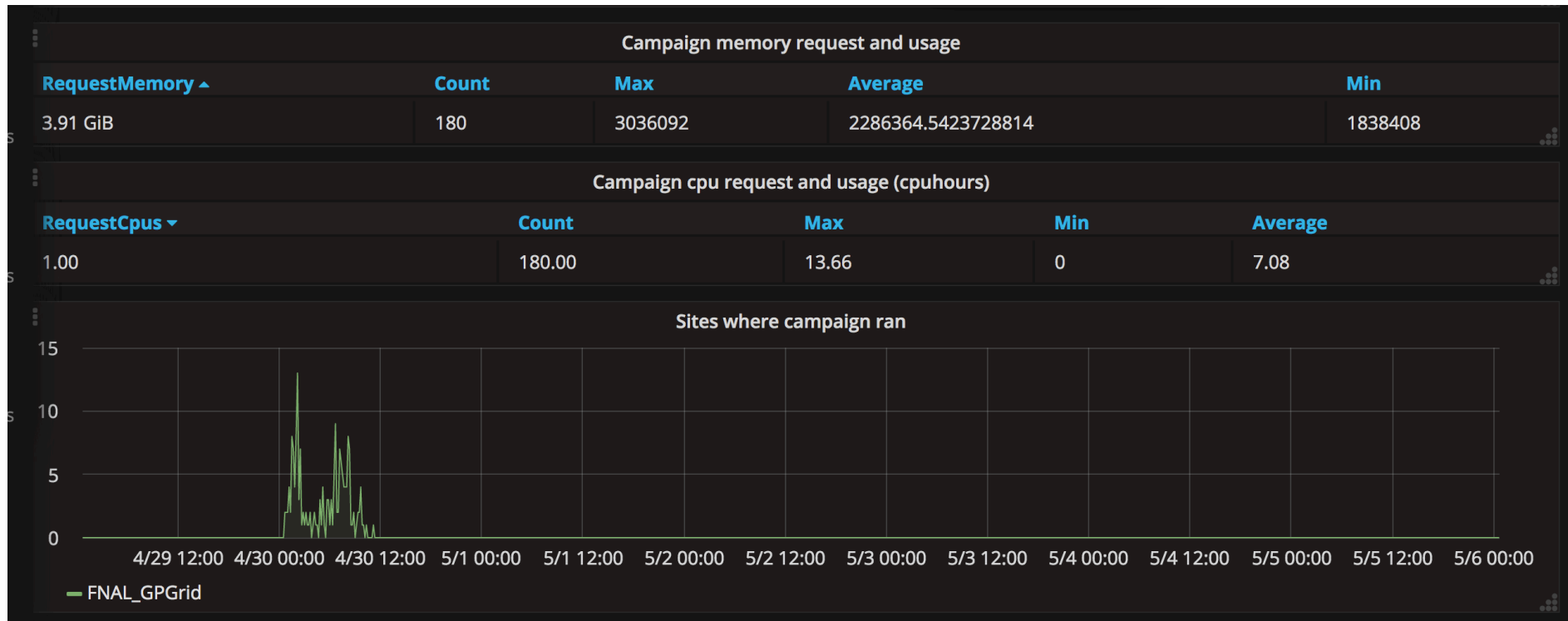
# Troubleshooting

## Jobs by node_name,user_exe_exit_code,name,experiment,count ?

🕐 2017-04-29 00:00 to 2017-05-06 00:00

<previous 7.0 days | next 7.0 days >

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dune ⬍    production ⬍

📅

[ node_name ✕ ] [ user_exe_exit_code ✕ ] [ name ✕ ] [ experiment ✕ ] [ ▾ ]    **Submit**

| node_name | user_exe_exit_code | name | experiment | count |
|---|---|---|---|---|
| fnpc9051.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p3GeV_sce | dune | 9 |
| fnpc4101.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p3GeV_sce | dune | 8 |
| fnpc8011.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p3GeV_sce | dune | 7 |
| fnpc8017.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p3GeV_sce | dune | 6 |
| fnpc7013.fnal.gov | 139 | mcc9_gen_G4_detsim_protoDune_beam_cosmics_p6GeV_sce | dune | 1 |
| fnpc7022.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p5GeV_sce | dune | 1 |
| fnpc5013.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p-1GeV | dune | 1 |
| fnpc6004.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p1GeV_sce | dune | 1 |
| fnpc9019.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p-1GeV | dune | 1 |
| fnpc8026.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p5GeV_sce | dune | 1 |
| fnpc9054.fnal.gov | 1 | mcc9_reco_protoDune_beam_cosmics_p5GeV_sce | dune | 1 |

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# Configure POMS

➢ Two configuration models implemented into POMS:

- Through a submission script that takes all configurations needed for the job submission and data handling

- Through a configuration file that takes all info needed for the job submission and data handling

**Highly recommended**

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# Create POMS Campaign Stage

# Schedule A Submission

## Campaign Launch Schedule ⍰

### Current Crontab Entry

10 0,2,4,6,8,10,12,14,16,18,20,22 * * * /home/poms/products/poms/current/cron/launcher --campaign_id=42 # POMS_CAMPAIGN_ID=42

### Update Entry form

Minutes(s) of the hour:

10

Hour(s) of day:

0,2,4,6,8,10,12,14,16,18,20,22

Day(s) of week:

☑ Any ☐ Sunday ☐ Monday ☐ Tuseday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

Day(s) of Month:

*

Submit   Delete

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# POMS Online Documentation

## Job

An individual batch-system job, part of a given Task's job submission, which associated with a Campaign. POMS ignores jobs which are not part of a Campaign. Jobs are considered to be in one of 5 high level states:

- Idle -- The job is waiting to be scheduled somewhere by the batch system
- Running -- The job has been started by the batch system, and is still running
- Completed -- the job has finished running
- Held -- the batch system has stopped the job for some reason (using too much memory, etc)
- Located -- the job was not only completed, but its output files have locations in the data handling system.

where the first 4 are the usual states are defined by Condor, and the fifth is peculiar to POMS. Within the Running state, there may be more details logged; i.e. "Running: running user executable" , "Running: copying in files", etc. where these can be determined from the ifdh joblogs.

## Service

A system that we depend on to run jobs, whose status is in some way determinable.

## Job Type

(Task Definition/Campaign (layer) Definition)

All the info you need to run a particular category of job -- i.e. "how do I launch a NOvA montecarlo job" or "how do I launch a Minerva calibration keepup job". This is filled in with information from a given Campaign to know how to run a submit a given Task.

## Submission

(Task)

A specific multi-job launch. It has a specific command line used to launch it, and it may have output files for whose appearance we await in the data handling system before we declare the task complete. It has states defined in terms of the jobs it generates as follows:

- Idle -- all of its jobs are Idle
- Running -- one or more of its jobs are Running
- Completed -- all of its jobs are Completed or Declared
- Located -- all of its jobs are Located

If another Submission in (another Campaign Layer) needs the output of this one to be launched, it must wait for this task to be in state "Located" before launching; or if the Submissions are generated with a Draining dataset definition, one waits for the previous task for this Campaign to complete before launching another.

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# References

POMS redmine project:
https://cdcvs.fnal.gov/redmine/projects/poms/

POMS team mailing list:
poms_team@fnal.gov

POMS production instance of POMS:
https://pomsgpvm01.fnal.gov/poms/

Marc Mengel's presentation at FIFE workshop 2016:
https://indico.fnal.gov/getFile.py/access?contribId=8&resId=0&materialId=slides&confId=12120

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# Thank You

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# Backup Slides

## POMS DIAGRAM
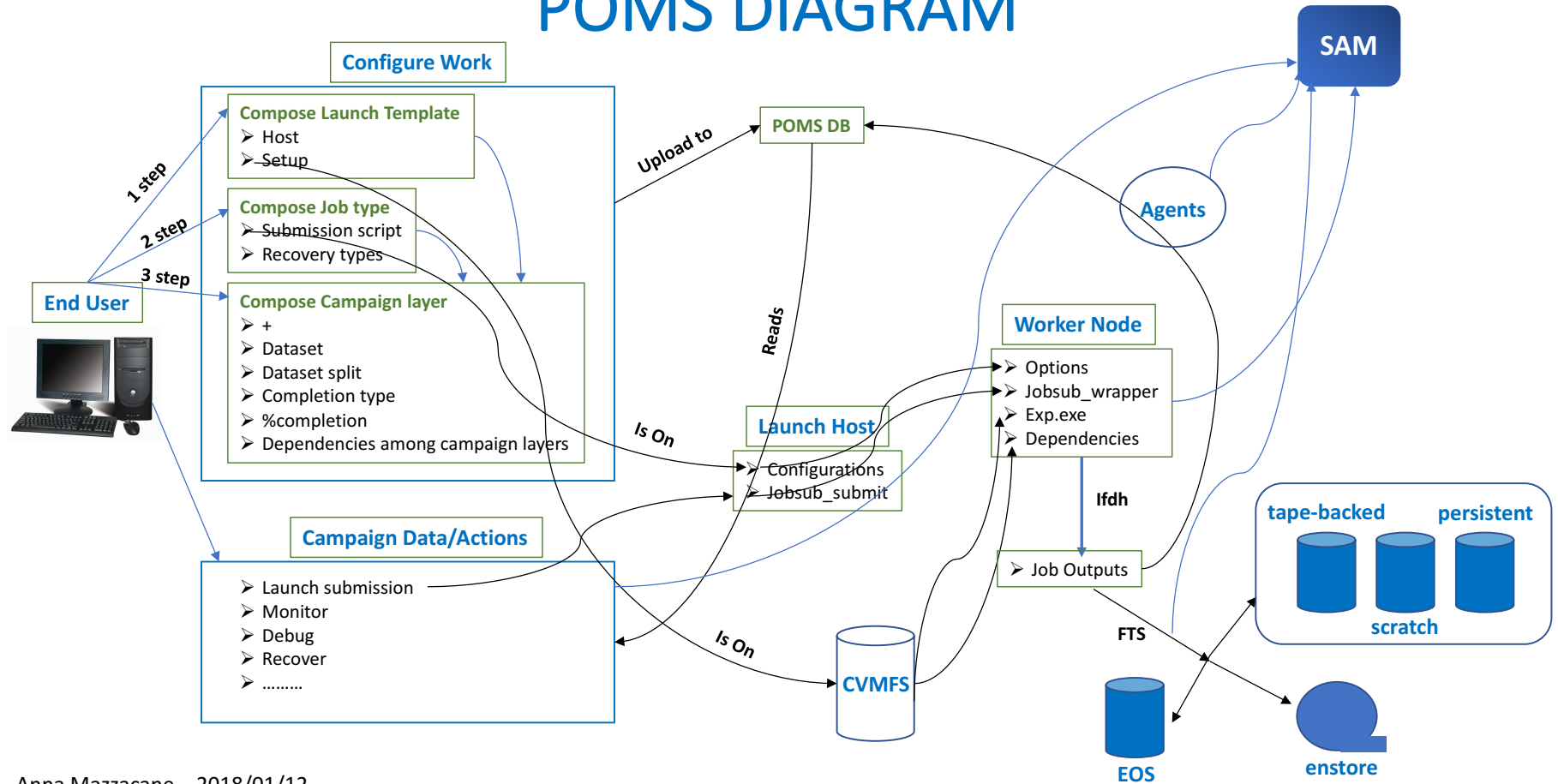


Anna Mazzacane – 2018/01/12

# SBND, ICARUS and POMS Update

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February 14, 2018

# Overview

➤ Last time I did an overview of POMS and showed some of the many features implemented in POMS

➤ Since then POMS has implemented a workflow example that doesn't use project.py, but allows to go through all the production steps using the FIFE toolkit.

➤ SBND and ICARUS can tune this workflow in order to meet the experiment needs for MC production

➤ In this slides, I will show:

  ➤ How to configure POMS

  ➤ Workflow example for SBND

  ➤ Issues found and solved – NOT depending on POMS

  ➤ Existing documentation

➤ Q&A

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# How To Configure POMS

➢ Last time I mentioned there are two configuration models to interface to POMS:

  - Through a submission script that takes all configurations needed for the job submission and data handling

  - Through a configuration file that handles all info needed for the job submission and data handling

    **Highly recommended**

➢ Both are passed to POMS through the web interface.

➢ Future plans will allow users to also interface to POMS client and launch jobs through a command line and have POMS tracking, debugging and monitoring them.

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# How To Configure POMS – Step by Step

➢ I will show step by step how to configure POMS for a general MC production workflow using:

- A configuration file to interface with POMS

➢ It's a two steps configuration:

- Edit the configuration file
- Create the POMS Campaign stages

➢ **Example of SBND worflow tested:**

| sbnd_gen_test | sbnd_g4_test | sbnd_detsim_test | sbnd_reco_test | sbnd_anatree_test |
|---|---|---|---|---|
| Submissions 16 Located 7 | Submissions 38 Located 19 | Submissions 36 Located 17 | Submissions 34 Located 17 | Submissions 34 Located 17 |

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➢ **I will show an example of SBND MC production workflow in POMS**
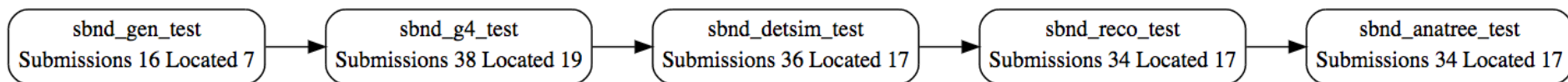
# How To Configure POMS – step 1

1. Edit the configuration file:

➢ **Example: /sbnd/app/home/poms_test/cfg/sbnd_launch.cfg**

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# Example of Configuration File

```
# demo config

[global]
group        = sbnd
experiment   = sbnd
wrapper      = file:///${FIFE_UTILS_DIR}/libexec/fife_wrap
version      = v06_48_00_MCC
quals        = e14:prof
fclfile      = override_me.
fclbasename=gen


[env_pass]
IFDH_DEBUG        = 1
SAM_EXPERIMENT=%(experiment)s
SAM_GROUP        =%(group)s
SAM_STATION        =%(experiment)s


[submit]
G                    = %(group)s
N                     = 5
#dataset              = %(dataset)s -- will override this on processing stages
resource-provides     = usage_model=OPPORTUNISTIC,DEDICATED,OFFSITE
generate-email-summary = True
expected-lifetime      = 3h
#disk                  = 10GB
memory                 = 2000MB
```

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# Example of Configuration File (cont'd)

```
[job_setup]
debug        = True
find_setups  = True
source_1     = /cvmfs/sbnd.opensciencegrid.org/products/sbnd/setup_sbnd.sh
setup_1      = sbndcode %(version)s -q %(quals)s
#multifile   = True -- may override this on processing stages
#getconfig   = False
#ifdh_art    = False

[sam_consumer]
limit          = 1
appvers        = %(version)s

[executable]
name     = lar
arg_1    = -c
arg_2    = %(fclfile)s
arg_3    = -o
arg_4    = %(basename)s.root
arg_5    = -s
#arg_6   = input_filename -- will be added by multifile loop...

[job_output]
addoutput          = %(basename)s.root
rename             = unique
dest               = /pnfs/sbnd/scratch/sbndpro/poms_test/
declare_metadata = True
metadata_extractor=sam_metadata_dumper
# add_to_dataset  =_poms_task  -- override this on on the gen stage(s)
add_location       =True
```

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# How To Configure POMS – step 2

1. Create POMS Campaign Stages:

➢ **Examples: sbnd_gen_test, sbnd_g4_test, sbnd_detsim_test, sbnd_reco_test, sbnd_anatree_test**

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# Create POMS Campaign Stages – Login

1.  Log into POMS
    https://pomsgpvm01.fnal.gov/poms/



➢ Use services account to login

➢ Need an experiment affiliation and computing permissions to submit jobs – **Ask your experiment production coordinator**

# Create POMS Campaign Stages – Home

# Create POMS Campaign Stages – Compose

# Create POMS Campaign Stages – Compose



> You can Add, Edit, Clone and Delete

# Create POMS Campaign Stages – Clone

# Create POMS Campaign Stages – Clone

- Change the Name
- Overrides Parameter of the configuration file (if needed)
- Create a dependency (for example, g4 stage depends on gen stage)
- Choose the Launch Template and Job Type from the drop down menu
- Click Clone

# Create POMS Campaign Stages – Run

# Create POMS Campaign Stages – Run

# Create POMS Campaign Stages – Run

# Create POMS Campaign Stages – Run

# Create POMS Campaign Stages – Run

# Create POMS Campaign Stages – Schedule

# Create POMS Campaign Stages – Schedule

## Campaign Launch Schedule ❓

### Current Crontab Entry

```
10 0,2,4,6,8,10,12,14,16,18,20,22 * * * /home/poms/products/poms/current/cron/launcher --campaign_id=42 # POMS_CAMPAIGN_ID=42
```

### Update Entry form

Minutes(s) of the hour:

```
10
```

Fill

Hour(s) of day:

```
0,2,4,6,8,10,12,14,16,18,20,22
```

Day(s) of week:

☑ Any ☐ Sunday ☐ Monday ☐ Tuseday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

Day(s) of Month:

```
*
```

Submit    Delete

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# Create POMS Campaign Stages – Schedule

## Campaign Launch Schedule ❓

### Current Crontab Entry

```
10 0,2,4,6,8,10,12,14,16,18,20,22 * * * /home/poms/products/poms/current/cron/launcher --campaign_id=42 # POMS_CAMPAIGN_ID=42
```

### Update Entry form

Minutes(s) of the hour:

```
10
```

Hour(s) of day:

```
0,2,4,6,8,10,12,14,16,18,20,22
```

Day(s) of week:

☑ Any ☐ Sunday ☐ Monday ☐ Tuseday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

Day(s) of Month:

```
*
```

[ Submit ]  [ Delete ]

*click*

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# Workflow Example for SBND

➤ We successfully ran the following workflow for SBND



| sbnd_gen_test Submissions 16 Located 7 | → | sbnd_g4_test Submissions 38 Located 19 | → | sbnd_detsim_test Submissions 36 Located 17 | → | sbnd_reco_test Submissions 34 Located 17 | → | sbnd_anatree_test Submissions 34 Located 17 |
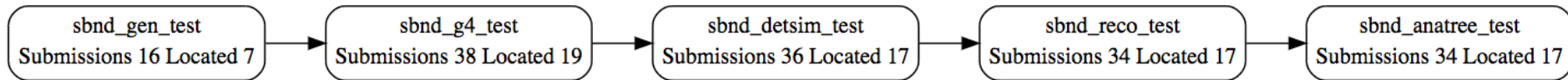
➤ Each stage of the workflow takes a SAM dataset input with the output files of the previous stage

➤ Each stage starts automatically when the previous one is finished

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# Workflow Example for SBND

# Workflow Example for SBND



POMS Update – ICARUS & SBND - February 14, 2018

# Workflow Example for SBND



POMS Update – ICARUS & SBND - February 14, 2018

# Workflow Example for SBND

# Workflow Example for SBND

# Workflow Example for SBND

# Workflow Example for SBND

POMS Update – ICARUS & SBND - February 14, 2018

# Workflow Example for SBND

# Found Issues and Solutions
# Not Depending on POMS

➢ We had to solve the following issues that not depends on POMS:

- Missing library for the g4 stage like libXmu.so
  Hooked them up with the NOvA cvmfs lib area.
  Still saw failures in some offsite nodes, so ran the g4 stage onsite
  Suggested solution: check which libraries you really need

- Art's "SAM metadata dumper" can generate metadata keys that aren't valid for SAM
  Added code to filter them out.
  Suggested solution: filter the "SAM compliant ones" and drop the rest

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# Get Help from POMS Team

# Get Help from POMS Team

# Existing Documentation

# Thank You

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# Backup Slides

POMS Project – ICARUS & SBND - February 02, 2018

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